Yet another **Lorenz** system

Recently, I stumbled over *Peter McNair’s* gerat blog *Analog Ontology*,\(^1\) where he describes – among many other highly interesting things – his implementation of a rather unknown attractor devised by **Edward N. Lorenz**. In 1984 *Lorenz* published a paper titled *Irregularity: a fundamental property of the atmosphere*\(^2\) where he describes a system of three coupled differential equations:

\[
\begin{align*}
\dot{x} &= -y^2 - z^2 - ax + af \\
\dot{y} &= xy - bxz - y + g \\
\dot{z} &= bxy + xz - z
\end{align*}
\]

The parameters of this system are \(a = \frac{1}{4}, b = 4, f = 8, g = 1\).

Scaling this system is pretty straight-forward as a quick numerical experiment shows: \(|x|\) and \(|y|, |z|\) are bounded by 2 and 3, respectively. The resulting analog computer program is shown in figure 1. Tweaking the parameters is quite interesting, a typical set of solutions is shown in figure 2.

**References**


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\(^1\)http://analog-ontology.blogspot.com/

\(^2\)See [Lorenz 1984].
Figure 1: Program for the chaotic Lorenz-84 system
Figure 2: Typical behavior of the LORENZ-84 system, the three screen shots show $x$ vs. $y$, $x$ vs. $z$, and $y$ vs. $z$. 